

CLAIMS

What is claimed is:

1. A method of attaching at least one semiconductor die having an active surface thereon to at least one lead of a lead frame having a plurality of leads, the at least one semiconductor die to be separated from a semiconductor wafer having a plurality of semiconductor dice thereon comprising:
determining criteria for an acceptable semiconductor die of the plurality of semiconductor dice;
testing each semiconductor die of the semiconductor wafer to determine if the criteria for the acceptable semiconductor die are included in any semiconductor die of the plurality of semiconductor die;
applying an adhesive in a wet film state in a form of one of a liquid and a paste in a predetermined pattern to portions of the active surface of an acceptable semiconductor die;
partially curing the adhesive from the wet film state to an intermediate tacky and flowable state;
removably attaching a portion of the at least one lead of the plurality of leads of the lead frame to a portion of the active surface of the acceptable semiconductor die using the partially cured intermediate tacky and flowable state adhesive;
identifying additional criteria of the acceptable semiconductor die attached to the lead frame;
testing the acceptable semiconductor die attached to the at least one lead of the plurality of leads of the leadframe to determine if the additional criteria are present in the acceptable semiconductor die;
removing the at least one lead of the plurality of leads of the lead frame attached to the acceptable semiconductor die therefrom if the acceptable semiconductor die is determined to be an unacceptable semiconductor die based on the testing; and
reworking the unacceptable semiconductor die.

2. The method of claim 1, wherein identifying the criteria for the acceptable semiconductor die includes identifying the criteria from one of before the acceptable semiconductor die is separated from a semiconductor wafer and after the acceptable semiconductor die is separated from the semiconductor wafer.

3. The method of claim 1, wherein identifying the criteria of the acceptable semiconductor die includes identifying the criteria after the acceptable semiconductor die is separated from a semiconductor wafer.

4. The method of claim 1, further comprising:
applying the adhesive to the acceptable semiconductor die only after the acceptable semiconductor die has been tested.

5. The method of claim 1, further comprising:
curing the adhesive after removably attaching the portion of the at least one lead of the plurality of leads of the lead frame to the acceptable semiconductor die.

6. The method of claim 1, wherein the adhesive is applied to more than one separated semiconductor die at a time.

7. The method of claim 1, wherein applying the adhesive includes:
screen printing the adhesive on the acceptable semiconductor die.

8. The method of claim 1, wherein applying the adhesive includes:
roll-on of the adhesive on the acceptable semiconductor die.

9. The method of claim 1, wherein applying the adhesive includes:
spraying the adhesive on the acceptable semiconductor die.

10. The method of claim 1, wherein applying the adhesive includes:
write dispensing the adhesive on the acceptable semiconductor die.

11. The method of claim 1, wherein applying the adhesive includes:
transferring the adhesive on the acceptable semiconductor die using a stamp pad.

12. The method of claim 1, wherein applying the adhesive includes:
syringe dispensing the adhesive on the acceptable semiconductor die.

13. The method of claim 1, wherein the at least one lead of the plurality of leads of the leadframe is attached to the acceptable semiconductor die before the adhesive is partially cured to the intermediate tacky and flowable state.

14. The method of claim 1, wherein the adhesive forms an adhesive layer that is between 8 microns and 200 microns thick.

15. The method of claim 1, further comprising:
applying the adhesive to the plurality of leads of the lead frame before attaching the at least one lead of the plurality of leads of the lead frame to the acceptable semiconductor die.

16. A method of attaching a semiconductor die having an active surface thereon to at least one lead of a lead frame having a plurality of leads, the semiconductor die provided from a semiconductor wafer having a plurality of semiconductor dice thereon comprising:
identifying criteria for an acceptable semiconductor die of the plurality of semiconductor dice,
identifying including one of identifying the criteria before the semiconductor die is separated from a semiconductor wafer and identifying the criteria for the acceptable semiconductor die includes identifying criteria after the semiconductor die is separated from the semiconductor wafer;

testing the semiconductor dice of the semiconductor wafer to determine if the criteria for the acceptable semiconductor die are included in a semiconductor die of the plurality of semiconductor dice;

applying an adhesive in a wet film state in a form of one of a liquid and a paste in a predetermined pattern to at least a portion of the active surface of more than one acceptable semiconductor die after the more than one acceptable semiconductor die has been identified using the criteria;

partially curing the adhesive from the wet film state to an intermediate tacky and flowable state; and

removably attaching portions of the at least one lead of the plurality of leads of the lead frame to the acceptable semiconductor die using the intermediate tacky and flowable state partially cured adhesive.

17. The method of claim 16, further comprising:

curing the adhesive after attaching the at least one lead of the plurality of leads of the leadframe to the acceptable semiconductor die.

18. The method of claim 16, further comprising:

identifying additional criteria for the acceptable semiconductor die attached to the at least one lead of the plurality of leads of the leadframe;

testing the acceptable semiconductor die attached to the at least one lead of the plurality of leads of the leadframe to determine if the additional criteria are present in the acceptable semiconductor die;

removing the at least one lead of the plurality of leads of the leadframe attached to the acceptable semiconductor die from the acceptable semiconductor die if the acceptable semiconductor die is determined to be an unacceptable semiconductor die based on the testing; and

reworking the unacceptable semiconductor die.

19. The method of claim 16, wherein the adhesive is applied to more than one separated acceptable semiconductor die at a time.

20. The method of claim 16, wherein applying the adhesive includes: screen printing the adhesive on the acceptable semiconductor die.

21. The method of claim 16, wherein applying the adhesive includes: roll-on of the adhesive on the acceptable semiconductor die.

22. The method of claim 16, wherein applying the adhesive includes: spraying the adhesive on the acceptable semiconductor die.

23. The method of claim 16, wherein applying the adhesive includes: write dispensing the adhesive on the acceptable semiconductor die.

24. The method of claim 16, wherein applying the adhesive includes: transferring the adhesive on the acceptable semiconductor die using a stamp pad.

25. The method of claim 16, wherein applying the adhesive includes: syringe dispensing the adhesive on the acceptable semiconductor die.

26. The method of claim 16, wherein the lead frame is attached to the acceptable semiconductor die before the adhesive is cured to the intermediate tacky and flowable state.

27. The method of claim 16, wherein the adhesive forms an adhesive layer that is between 8 microns and 200 microns thick.

28. The method of claim 16, further comprising:
applying the adhesive to the plurality of leads of the lead frame before attaching the at least one lead of the lead frame to the acceptable semiconductor die.

29. A method of attaching a semiconductor die to a lead frame, the semiconductor die provided from a semiconductor wafer having a plurality of semiconductor dice thereon comprising:
identifying acceptable criteria of a semiconductor die of the plurality of semiconductor dice,
identifying including one of identifying the criteria before the semiconductor die is separated from the semiconductor wafer and identifying the criteria for the acceptable semiconductor die includes identifying criteria after the semiconductor die is separated from a semiconductor wafer;
identifying an acceptable semiconductor die having the acceptable criteria;
applying a wet film adhesive in one of a liquid and a paste to portions of at least two lead fingers of the lead frame in a predetermined pattern;
applying an adhesive in a wet film state in one of a liquid and a paste to portions of the active surface of the acceptable semiconductor die in a predetermined pattern;
curing the adhesive on the at least two lead fingers of the lead frame and the acceptable semiconductor die active surface from the wet film state to an intermediate tacky and flowable state; and
removably attaching the at least two lead fingers of the leadframe to the acceptable semiconductor die.

30. The method of claim 29, further comprising:
curing the adhesive after attaching the at least two lead fingers of the lead frame to the acceptable semiconductor die.

31. The method of claim 29, further comprising:
identifying additional acceptable criteria of acceptable semiconductor die attached to the at least two lead fingers of the lead frame;
testing the acceptable semiconductor die attached to the at least two lead fingers of the lead frame to determine if the additional acceptable criteria are present in the acceptable semiconductor die;
removing the at least two lead fingers attached to the acceptable semiconductor die from the acceptable semiconductor die if the acceptable semiconductor die is determined to be an unacceptable semiconductor die based on the testing; and
reworking the unacceptable semiconductor die.

32. The method of claim 29, wherein the adhesive is applied to more than one separated acceptable semiconductor die at a time.

33. The method of claim 29, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:
screen printing the adhesive on the acceptable semiconductor die.

34. The method of claim 29, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:
roll-on of the adhesive on the acceptable semiconductor die.

35. The method of claim 29, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:
spray-on of the adhesive on the acceptable semiconductor die.

36. The method of claim 29, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:
write dispensing the adhesive on the acceptable semiconductor die.

37. The method of claim 29, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:
transferring the adhesive on the acceptable semiconductor die using a stamp pad.

38. The method of claim 29, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:
syringe dispensing the adhesive on the acceptable semiconductor die.

39. The method of claim 29, wherein the adhesive forms an adhesive layer that is between 8 microns and 200 microns thick.

40. The method of claim 29, wherein the adhesive is applied as a powder on a surface of the acceptable semiconductor die which has a wetting agent thereon.

41. A method of attaching at least one semiconductor die having an active surface thereon to at least one lead of a lead frame having a plurality of leads, the at least one semiconductor die to be separated from a semiconductor wafer having a plurality of semiconductor dice thereon comprising:
determining criteria for an acceptable semiconductor die of the plurality of semiconductor dice;
testing each semiconductor die of the semiconductor wafer to determine if the criteria for the acceptable semiconductor die are included in each semiconductor die to identify an acceptable semiconductor die having the criteria;
applying adhesive in a predetermined pattern to at least one lead of a plurality of leads of a lead frame in a form of one of a liquid and a paste before attaching the at least one lead of the lead frame to the acceptable semiconductor die;
partially curing the adhesive from the wet film state to an intermediate tacky and flowable state while on the portions of the plurality of leads of the lead frame;

removably attaching a portion of the at least one lead of the plurality of leads of the lead frame to a portion of the active surface of the acceptable semiconductor die using the partially cured intermediate tacky and flowable state adhesive;
identifying additional criteria of the acceptable semiconductor die attached to the lead frame;
testing the acceptable semiconductor die attached to the at least one lead of the plurality of leads of the lead frame to determine if the additional criteria are present in the acceptable semiconductor die;
removing the at least one lead of the plurality of leads of the lead frame attached to the acceptable semiconductor die therefrom if the acceptable semiconductor die is determined to be an unacceptable semiconductor die based on the testing; and
reworking the unacceptable semiconductor die.

42. The method of claim 41, wherein identifying the criteria for the acceptable semiconductor die includes identifying the criteria from one of before the acceptable semiconductor die is separated from a semiconductor wafer and after the acceptable semiconductor die is separated from the semiconductor wafer.

43. The method of claim 41, wherein identifying the criteria of the acceptable semiconductor die includes identifying the criteria after the acceptable semiconductor die is separated from a semiconductor wafer.

44. The method of claim 41, further comprising:
applying adhesive to an acceptable semiconductor die after the acceptable semiconductor die has been tested.

45. The method of claim 41, further comprising:
curing the adhesive after removably attaching the portion of the at least one lead of the plurality of leads of the lead frame to the acceptable semiconductor die.

46. The method of claim 41, wherein the adhesive is applied to more than one separated semiconductor die at a time.

47. The method of claim 41, wherein the adhesive forms an adhesive layer that is between 8 microns and 200 microns thick.

48. A method of attaching a semiconductor die having an active surface thereon to at least one lead of a leadframe having a plurality of leads, the semiconductor die provided from a semiconductor wafer having a plurality of semiconductor dice thereon comprising:
identifying criteria for an acceptable semiconductor die of the plurality of semiconductor dice,
identifying including one of identifying the criteria before the semiconductor die is separated from a semiconductor wafer and identifying the criteria for the acceptable semiconductor die includes identifying criteria after the semiconductor die is separated from a semiconductor wafer;
testing the semiconductor dice of the semiconductor wafer to determine if the criteria for the acceptable semiconductor die are included in a semiconductor die of the plurality of semiconductor dice;
applying an adhesive in a predetermined pattern in a wet film state in a form of one of a liquid and a paste in a predetermined pattern to at least one lead of a plurality of leads of a lead frame and the active surface of a semiconductor die after more than one acceptable semiconductor die has been identified using the criteria;
partially curing the adhesive from the wet film state to an intermediate tacky and flowable state;
and
removably attaching portions of the at least one lead of the plurality of leads of the lead frame to the acceptable semiconductor die using the intermediate tacky and flowable state partially cured adhesive.

49. The method of claim 48, further comprising:
curing the adhesive after attaching the at least one lead of the plurality of leads of the lead frame to the acceptable semiconductor die.

50. The method of claim 48, further comprising:
identifying additional criteria for the acceptable semiconductor die attached to the at least one lead of the plurality of leads of the lead frame;
testing the acceptable semiconductor die attached to the at least one lead of the plurality of leads of the lead frame to determine if the additional criteria are present in the acceptable semiconductor die;
removing the at least one lead of the plurality of leads of the lead frame attached to the acceptable semiconductor die from the acceptable semiconductor die if the acceptable semiconductor die is determined to be an unacceptable semiconductor die based on the testing; and
reworking the unacceptable semiconductor die.

51. The method of claim 48, wherein the adhesive is applied to more than one separated acceptable semiconductor die at a time.

52. The method of claim 48, wherein the lead frame is attached to the acceptable semiconductor die before the adhesive is cured to the intermediate tacky and flowable state.

53. The method of claim 48, wherein the adhesive forms an adhesive layer that is between 8 microns and 200 microns thick.

54. A method of attaching a semiconductor die to a leadframe, the semiconductor die provided from a semiconductor wafer having a plurality of semiconductor dice thereon, each semiconductor die of the plurality of semiconductor dice having an active surface, comprising:

identifying acceptable criteria of a semiconductor die of the plurality of semiconductor dice,
identifying including one of identifying the criteria before the semiconductor die is
separated from a semiconductor wafer and identifying the criteria for the acceptable
semiconductor die includes identifying criteria after the semiconductor die is separated
from a semiconductor wafer;
identifying an acceptable semiconductor die having the acceptable criteria;
applying a wet film adhesive in one of a liquid and a paste to portions of at least two lead fingers
of the lead frame;
applying an adhesive in a predetermined pattern in a wet film state in one of a liquid and a paste
to portions of the active surface of the acceptable semiconductor die in a predetermined
pattern;
curing the adhesive on the at least two lead fingers of the lead frame and the acceptable
semiconductor die active surface from the wet film state to an intermediate tacky and
flowable state; and
removably attaching the at least two lead fingers of the leadframe to the acceptable
semiconductor die.

55. The method of claim 54, further comprising:

curing the adhesive after attaching the at least two lead fingers of the lead frame to the acceptable
semiconductor die.

56. The method of claim 54, further comprising:
identifying additional acceptable criteria of acceptable semiconductor die attached to the at least two lead fingers of the lead frame;
testing the acceptable semiconductor die attached to the at least two lead fingers of the lead frame to determine if the additional acceptable criteria are present in the acceptable semiconductor die;
removing the at least two lead fingers attached to the acceptable semiconductor die from the acceptable semiconductor die if the acceptable semiconductor die is determined to be an unacceptable semiconductor die based on the testing; and
reworking the unacceptable semiconductor die.

57. The method of claim 54, wherein the adhesive is applied to more than one separated acceptable semiconductor die at a time.

58. The method of claim 54, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:
screen printing the adhesive on the acceptable semiconductor die.

59. The method of claim 54, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:
roll-on of the adhesive on the acceptable semiconductor die.

60. The method of claim 54, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:
spray-on of the adhesive on the acceptable semiconductor die.

61. The method of claim 54, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:
write dispensing the adhesive on the acceptable semiconductor die.

62. The method of claim 54, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:

transferring the adhesive on the acceptable semiconductor die using a stamp pad.

63. The method of claim 54, wherein applying the adhesive to the active surface of the acceptable semiconductor die includes:

syringe dispensing the adhesive on the acceptable semiconductor die.

64. The method of claim 54, wherein the adhesive forms an adhesive layer that is between 8 microns and 200 microns thick.

65. The method of claim 54, wherein the adhesive is applied as a powder on a surface of the acceptable semiconductor die which has a wetting agent thereon.